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RESERVE OUR ANTHRACITE FOR OUR NAVY.

BY REAR-ADMIRAL ROBLEY D. EVANS, U.S.N., COMMANDER-IN-CHIEF OF THE NORTH ATLANTIC FLEET.

I BELIEVE that the Government of the United States should at once possess itself of the entire anthracite field of Pennsylvania and retain it for purposes of national defence. And if, through accidental discovery, other deposits of this precious mineral are developed, they should be instantly appropriated by the national Government and reserved for its own uses. Being a sailor, of course I mean naval uses, first of all.

The proposition is, I know, startling, but I believe its soundness can be demonstrated.

A Matchless Naval Weapon.—No other maritime nation possesses a naval weapon of such tremendous power as America in its anthracite. Now and again comes the announcement from some enthusiastic geologist that rich deposits of this coal have been discovered in various foreign lands; but, somehow, these promises never materialize, and the fact remains that America alone possesses hard coal in workable locations. The quantity is not infinite, it is true; and that fact is the basis of this argument; but, practically, America alone produces anthracite, and the nation should realize the value of that possession as a naval weapon beyond the reach of any other sea Power.

And that value is found in the fact that, of all fuels possible of use in war-ships, anthracite alone is capable of developing great power without producing smoke. Clean, hard, of uniform size and easily handled, it burns brightly and strongly under the boilers, without betraying, by the faintest visible emission of smoke from the funnels, the tremendous work it is doing.

Billions of Tons of Bituminous Coal.—Bituminous coal is the world's fuel. It can be found in various degrees of excellence everywhere. Poor indeed is the country that cannot count among its resources at least brown coal, capable of being consumed in specially devised furnaces. Even our Western prairie lands, beyond the Mississippi, yield an inexhaustible store of this material. The quality increases towards the Appalachian range, until we reach the rich Pocahontas fields of Virginia and the inexhaustible deposits of the Cumberland region. France and Germany and Austria possess it, and in the Welsh mines of Great Britain it finds its final development. Even in far-away Australia, in New South Wales and the Japanese Orient, and in that latest great battle-ground of the world, Manchuria, bituminous coal is being dug out of the earth in quantities sufficient, not only for local consumption, but for export as well. It is not possible to estimate with any fair degree of accuracy the amount of this mineral "in sight," as the experts say. Countless billions of tons is the guess of the geologist.

American Consul Mahin of Nottingham, in an official report to the Department of State, quotes German statisticians to show that their country has enough bituminous coal in sight to last two thousand years; 280 billion tons is the figure. Even Great Britain and Ireland can yield nearly 193 billion tons—a supply for four hundred years at the present rate of consumption. Belgium has 23 billion tons underground; France, 19 billion; Austria, 17 billion; and Russia, 40 billion. These figures are dwarfed by the estimates of the resources of the Far East, for one Chinese province—that of Shansi—is credited with the possession of more than a trillion tons of bituminous coal. Siberia and Sakhalin are believed to contain vast deposits of unestimated extent.

So bituminous coal is to-day the fuel of the world's industries; it turns the wheels of all factories; sweats out the iron and the steel from the reluctant earth, and furnishes the electric current that has revolutionized our whole system of life. Also, it propels across the seven seas the ships that carry the world's commerce, and in time of need do its fighting.

Superiority of Anthracite.—But, in my opinion, anthracite is the ideal fuel for American naval purposes. A paramount consideration in naval warfare is invisibility. Strategically, this is one of the greatest factors, either for offence or defence. The ability to creep close upon an enemy's ship without detection is an enormous advantage in the attack; and it goes without saying that the possibility of accomplishing a safe retreat before a superior naval force, or of slipping undiscovered through an enemy's line of battle, is not to be disregarded.

Anthracite helps to these ends, and to others equally desirable. It makes no smoke; and smoke is the telltale signal which betrays the war-ship. Did you ever sit on the deck of a liner, or perhaps on one of the ocean piers of Atlantic City, and watch a merchantman creep along many miles away—even below the horizon—betrayed by its line of smoke? That vessel was going easily, trying to burn her fuel economically—which means, to consume as much as possible of the carbon in her coal, instead of sending it up through her smoke-stacks.

Multiply the coal consumption a dozen times; send out clouds of inky blackness two hundred feet in the air, trailing along ten miles across the sea, and you have a picture of a great battle-ship forging along under forced draught. Mass five or ten or twenty such ships in one fleet, and then imagine the vastness of the signal spread to the enemy, and calculate the chances of escaping detection in a hostile manœuvre.

Costly War Lessons.—When Admiral Dewey made his entrance into Manila Bay on that memorable First of May, disaster nearly followed the use of soft coal. Wisely he chose the night for his enterprise, so as to disguise his approach and conceal the dense clouds of black smoke emitted by his ships. Yet, at a critical moment, the funnels of the "McCullough," urged as the little cutter was to keep up with the leaders, spouted blasts of flame that drew upon her the fire of the great guns on Corregidor Island, at the mouth of the bay. Perhaps it was a fortunate disposition that she was at the end of the fleet, and that all of the fighting-ships had safely passed beyond range of the forts before the "McCullough" hung this warning in the skies.

The testimony of the Russians who defended Port Arthur for nearly a year is also important in its bearing on this question of naval fuel. The lookouts rarely failed to discover the approach of the Japanese besieging fleet and give timely warning to their scouting-ships outside the harbor, and always by the telltale clouds of smoke. Torpedo-boats especially were detected, and when they made their forays by night they were often betrayed by an untimely blaze from their funnels, and forced back by a merciless fire from the guns on the heights.

Obscure Signals.—My own experience on the flag-ship "Maine" has revealed another, and a very grave, objection to the use of bituminous coal in naval warfare, and that is the confusion of signals caused by smoke. A "fleet in being" lives and coheres through the ability of the admiral in command to keep in close touch with its every unit, from the battle-ships of the fighting-line to the scouting cruisers far in advance and on the flanks; with the torpedo-boat-destroyers, the colliers and supply-boats, and perhaps the troop-transports under convoy. The installation of wireless-telegraphic apparatus has done much to make the communication easier and more far-reaching; in fact, it has revolutionized naval strategy. Taking advantage of the progress across the Atlantic of the floating-dock "Dewey," fitted out with the admirable naval system of wireless telegraphy, the capable commanders of my fleet, by a proper method of disposition of their ships, were enabled to keep in touch with Commander Hosley on the "Glacier," leading the towing fleet, and to report to Washington directly, when the "Dewey" was more than a thousand miles distant from our shores.

But these are new and unstable conditions. In time of stress and trouble and for every-day work, the sailor turns to the old reliable system of flag signals—a string of triangles and squares and differently colored bits of bunting hung from the signal-mast of the flag-ship, that indicates precisely to every commander in the fleet the orders of the admiral in command.

That is where we have trouble on the "Maine" when we burn bituminous coal under her boilers. The clouds of dense black smoke frequently so obscure the signal-flags that they cannot be read by the signal-man on the other ships. Sometimes it even becomes necessary for the flag-ship to surrender the position at the head of the fleet that she should preserve, and to fall astern and to the rear, in order that her signals may be seen. That might be disastrous in time of war.

All of this difficulty might be avoided by the use of anthracite, as has been proved by actual trial. Not without remonstrance from the engineers and firemen, most conservative of men, anthracite was tested in the boilers of the "Maine." The fuel was not all that could be desired; it was of the cheapest grade, what is known as "pea coal," for economy was a consideration that could not be lost sight of, and this kind of coal cost no more—

ton for ton—than good bituminous. The results, however, fully justified the experiment. There was no smoke; the heaviest firing of the furnaces brought forth no torches of flame from the smokestacks, and the "Maine" could easily have crept past the most closely guarded harbor entrance in time of war without detection, so far as her firing was concerned. Contrast that trial with the experience of the coast-defence ship "Monterey," burning the soft coal of Puget Sound, with flames issuing from her red-hot funnels, and the decks around them scorched and burning, as reported to the Navy Department, when she made the experiment of using that kind of fuel, to satisfy a local demand. The converted yacht-cruiser "Mayflower" has also tried anthracite, with results as favorable as followed my own test.

Anthracite in the Civil War.—It is a fact not generally known at present that anthracite was the naval fuel of the Civil War, on the Northern side at least, and every American should be proud of that page of history. Only by the use of that fuel was the Federal fleet enabled to maintain the greatest blockade the world has ever known, on thousands of miles of coast-line, from the Virginia Capes to the Mexican boundary on the Gulf of Mexico. The blockade-runners were obliged to use soft coal, and that was their undoing in most cases. Some got through the lines in fogs and bad weather; but, for the most part, they were detected by their trails of smoke and flame long before they could espy the blockading craft burning smokeless fuel, and either driven away or captured. It has been said that the Confederacy was "starved to death"; maybe this was one of the factors that has been overlooked by the historian.

Why Was Anthracite Abandoned?—The question naturally arises, Why was the use of anthracite abandoned by the American Navy? The answer is to be found in two words, "economy" and "speed." For many years after the Civil War, American naval vessels continued to use hard coal. Those were the days of combined sailing and steaming ships, and coal was used sparingly and only in cases where great haste was required. In the ordinary course of naval cruising, the furnaces were lighted only in stress of weather, against head-winds or in making port. There was not as much steam-power in a whole fleet as is represented in a single armored cruiser like the "Maryland." So the coal consumption was small and the bills insignificant.

When, in the early eighties, the nation awoke to the need of a new navy, our designers naturally turned to British models. Officers were sent abroad to study their plans, and some of these were bought outright and laid the foundations of our New Navy. What are known as our " A-B-C ships " were built on these plans. Good and serviceable ships they were, too, as I can testify, having sailed on and commanded them.

Like all foreign-designed ships, they were planned for the use of soft coal. Their grates were constructed for bituminous coal and their speed calculations based on it. Engineers say that for a given grate surface more power—and that means speed—may be obtained from soft than from hard coal, and speed was then regarded as everything. But we now know that there are other factors in naval warfare quite as important, and I have endeavored to demonstrate that fact. At the time, however, we were swept along in the mad race for speed; the close grate disappeared, and bituminous coal displaced our own black diamonds as the fuel of the Navy. The change satisfied the engineers, ambitious to get the most work out of every pound of machinery and boilers in the ship. And it was agreeable to those high in authority, who were obliged to meet the demands of an economical Congress, because bituminous was cheaper than anthracite at that time, and more cruising could be done for the same amount of money.

Is there a Better Naval Fuel?—Recent wonderful developments in the oil-fields of Texas and California have led many engineers to urge the use of crude petroleum as the ideal naval fuel. The suggestion is enticing; and so strong were the arguments advanced in favor of this easily handled means of producing power, that the Navy Department was induced to enter upon a series of long and costly experiments to determine the comparative value of liquid fuel and coal. For nearly a year some of the most expert naval engineers worked upon the problem in a specially devised plant installed in Washington, trying specimens of every oil offered and testing innumerable inventions in burners.

So far the results have been disappointing. Coal-oil will burn freely under boilers and meet many of the demands of the maritime engineers, especially of the merchant marine. But there are grave objections to its use as a naval fuel. It can be burned with advantage in a ship that is required to jog along at a certain uniform speed on its voyage between ports, but it will not admit of forcing, which is absolutely necessary in naval use. There are occasions when a naval captain must be prepared to drive his ship at top speed, regardless of consequences, and forgetting economy. He may be chasing a blockade-runner or an enemy; he may be fleeing before a greatly superior force. Forced draught must be applied under closed fire-hatches. That is where the oil-fuel fails. Only a certain quantity can be consumed under each boiler, the burners are limited in number, and the steam-pressure cannot be increased, which means that the ship is limited in its speed—there is no emergency ratio.

There are two other objections to the use of oil in the Navy as fuel. The storage aboard ship of the thousands of gallons of this fuel necessary for a cruise, alongside of tons of high explosives, would be exceedingly dangerous. The ship's company would be living over a volcano, so to speak. And in battle a single shell from the enemy might fire the whole ship.

And where will it be possible to secure oil on foreign stations to replenish the tanks of our war-ships? At only a few ports could the petroleum be had at reasonable rates; at most its cost would be prohibitive.

Anthracite for Us.—No; let us turn again to our own anthracite, and let us keep it for our own Navy, every ton of it. Pile it up in our naval stations at home; make great stores of it at the coaling-stations we now have abroad, and acquire more of these stations from friendly nations at convenient points in foreign lands. In a way, it will be safely stored; for, though we may be deprived of it, the ships of no other maritime Power can use it, by reason of the construction of their boiler furnaces, while our own ships may use their bituminous, in case of need, by a few simple mechanical changes in the grate bars.

The Cost of It.—It will be costly, of course, but it will pay to keep our anthracite for our own Navy. The estimates of the Geological Survey place the amount of anthracite "in sight" in America at great figures — no less than sixteen billion tons four years ago; but of this only six billion four hundred and fifty million tons is minable. The Census reports say that this will be exhausted by domestic uses in about fifty years. The consumption in 1905 was 69,339,152 tons and was yearly increasing.

Suppose we should stop this industrial and domestic consumption, and reserve the supply which can never be replenished;

the American Navy would be coaled for a long time. Last year the Equipment Bureau bought 543,000 tons of coal, and about 50,000 tons were used in the winter manœuvres of the Atlantic fleet in the Caribbean Sea. With the steady annual growth of the Navy, that must surely proceed if America is to retain her place among the World Powers, the coal consumption of the ships must necessarily increase. To be efficient, seamen must be trained, and that means that ships must be kept in commission and must burn much coal.

About eighteen billion dollars would represent, at present values, the available anthracite deposits which the United States Government should acquire to possess the entire store of this fuel. The figures are startling; but remember that this vast sum is not necessarily to be disbursed at once. In fact, it may be spent in the course of centuries—only, indeed, as the fuel is mined and consumed. It will be for the actuary to calculate the compensation which the Government shall make to the individual owners of the coal-fields; to capitalize their holdings, and provide for a systematic reimbursement. Of the wisdom of such a transaction I have no doubt. Think of the insurance value of the great ports of America. Many millions are spent every year to guard against losses by such earthquakes and fires as almost destroyed San Francisco; why not spend a few millions annually to safeguard all of these ports against a fierce naval attack?

Against our will; by the practice of the arts of peace; indeed, through our industrial competition with foreign nations and our insistence upon our rights to equal privileges and fair treatment; we may at any moment be plunged into hostilities. That is where that celebrated utterance of Pinckney's would find its bearing—"Millions for defence but not one cent for tribute." The millions would lie in our anthracite-beds, and our Navy would do the rest. Picture the fate of a vast hostile fleet assembled off our Atlantic seaboard, with its colliers and tenders laden with soft coal, belching great clouds of smoke of inky blackness by day and columns of fire by night, while around them circled our swift scouts and cruisers and torpedo-boats and, within convenient signal range, our great battle-ships, each representative of a sovereign State—all well-nigh invisible, but ready to dash in at an opportune moment and deal a vital stroke. And all because of anthracite. Would it not pay?

R. D. EVANS.